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10/821,368	04/09/2004	Yukio Miyaki	09792909-5862	1192

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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,368	MIYAKI ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2002*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received November 10, 2008:

a. Claims 1-4 are pending.

b. The core of the previous rejection is maintained with a new piece of prior art relied upon, as necessitated by the amendment. All changes to the rejection are necessitated by the amendment, thus the action is final.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-4 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 now recites that "the anode active material in contact with the outer anode active material is made of a material that is easily alloyed with the outer active material layer, and the active material layer in contact with the inner anode active material layer is made of a material that is easily alloyed with the inner active material"

(lines 25-30). However, there is no support for active materials alloying with active materials, as stated in the claim. Instead, the Specification provides support for an anode current collector that is easily alloyed with the inner and outer active materials of the anode (see page 9, lines 12-17). Accordingly, it is submitted that such claim limitations are new matter.

3. Claims 1-4 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 now recites that "the anode active material in contact with the outer anode active material is made of a material that is easily alloyed with the outer active material layer, and the active material layer in contact with the inner anode active material layer is made of a material that is easily alloyed with the inner active material" (lines 25-30). However such claim language is indefinite, as one of ordinary skill in the art would appreciate that the term alloy is between two different materials. Accordingly, how the active material in contact with itself (either outer or inner active material) would be easily alloyed in the claimed manner.

4. **NOTE:** In light of the 112 issues above, the following claim interpretation has been applied: that the *anode current collector* in contact with outer and inner active material layers is made of a material that is easily alloyed with the active material layers. Such an interpretation is taken in light of the statements in Applicant's Specification (p 9, lines 12-17) as well as the response submitted on November 10, 2008 (see page 4, second paragraph under section II, the response to the 103 rejections).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0704921A1 (Fujimoto et al.) in view of WO 02/21616 (Fukui et al.) and WO 01/29918 (Ikeda et al.). (Note: US 2004/0043294 is being relied upon as an English translation of WO 02/21616, both of which stem from PCT/JP01/07519. Also US 7241533 is being relied upon as an English translation for WO 01/29918, both of which stem from PCT/JP00/07297).

As to claim 1, Fujimoto et al. teaches a cylindrically wound battery, where the electrode material mixture (both positive electrode, cathode, and negative electrode, anode are included) is present on both the inner and outer sides of the current collector (abs). Furthermore, the negative electrode active material is chosen such that the efficiency of lithium intercalation and deintercalation is high (p3, lines 37-39). The compounds used in the negative electrode materials are from groups IIIb, IVb, and Vb of the periodic table (all of which fit the description of metals or metalloids capable of alloying with lithium and compounds therefore) (p3, lines 32-36). Staring at p3, line 40, many examples of active materials are listed.

As previously stated, the battery of Fujimoto et al. is cylindrical (p2, lines 48-49). NOTE: A cylinder inherently has a circular cross section (sectional surface shape), as is defined by the constraints of a cylindrical volume. A circle is a special type of ellipse; in an ellipse that is a circle, the longest diameter to the

shortest diameter is 1:1 (or 1, inclusive, as claimed by the instant application). Furthermore, it is listed that the thickness of electrode material mixture on the inner side of the collector is from 60% to 97%, more preferably 70% to 95%, of the outer collector. The difference in thickness inherently provides a difference in capacity, as the thicker layer contains more active material, and thus has more capacity. In Fujimoto's teaching, the ratio ranges of capacity of the outer active material to the inner active material would be from 1:0.6 to 1:0.97, inclusive, more preferably 1:0.7 to 1:0.95, inclusive. A portion of Fujimoto et al.'s range covers the claimed ratio, and therefore would inherently provide the same claimed ratio difference.

Alternately, it can be said that Fujimoto et a. does not disclose the specific capacity ratio of the outer anode active material to the inner active anode material that is from 1:0.6 to 1:0.8, inclusive. However, it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without

a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16 USPQ2d 1935,1937 (Fed. Cir. 1990)). Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955)).

Fujimoto et al. does not teach (a) that the anode active layers are alloyed through heat treatment with the anode current collector in at least a portion of the interface with the anode current collector, wherein (b) the current collector is easily alloyed with outer and inner active material layers or (c) that the anode current collector is made of a plurality of layers.

With respect to (a), Fukui et al. teach of sintering (heating) the anode active material and conductive particles with the current collector in order to improve adhesion between the active material/conductive particles with the current collector, which suppresses the separation of the anode material from the current collector (para 0018). It is further noted that the current collector is made of a material, which when heat treated diffuses into the active material particles and thus acts to adhere the active material to the current collector (alloying at the interface) (para 0022). The motivation for wanting to heat treat and alloy the current collector with the anode active material layer is to improve adhesion between the two layers. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a heat treatment step to the battery of Fukui et al. in order to alloy the anode active material to the current collector, which in turn provides better adhesion between the two layers and provides better charge-discharge characteristics. (It is noted

that the process embodied in Fukui et al. would provide the alloying, as claimed, even though that particular language is note used. Para 0031 embodies heat treating temperatures, 200-500°C, and Table 4 shows more heat treating conditions, wherein the heat treatment times range from 10-30 hours. This is similar to the heat treatment embodied by Applicant, wherein one example embodies heating at 200°C for 24 hours (p 23, lines 15-18) and 400°C for 12 hours (p 28, lines 21-24). Furthermore, such a treatment taught by Fukui et al., as applied to Fujimoto et al, would yield the alloyed structure not only because the heat treatments are similar, but also because the materials used are similar, too. Fukui et al. teaches of the use of similar materials for the active material as well as the current collector as that of the Instant Application and Fujimoto et al. (see p 9, first paragraph in the Specification and p8, line 18 and p 14, lines 47-50 in Fujimoto et al.). Fukui et al. teaches of a copper current collector and a silicon containing active material (see para 0022, lines 87-11; para 0024, lines1-3).).

With respect to (b), it is submitted that the combination of Fujimoto et al. and Fukui et al. would yield an anode current collector that is easily alloyed with both outer and inner active material layers. Such a reasoning is set forth below:

(1) Fujimoto exemplifies active materials used as well as current collecting materials used. For example, example 3 is relied upon to exemplify the use of a negative active material (both outer and inner) containing both Sn and Si (compound 4-D) in conjunction with a copper current collector (p8, line 18; p14, lines 47-50). It is noted that Fukui et al. teach of similar materials: copper current collector and a silicon containing active material (see para 0022, lines 87-11;

para 0024, lines1-3). The ease at which materials are alloyable are inherent to the materials. Accordingly, it would be inherent that such a current collector material (copper) is a material that can be easily alloyed with both the outer and inner active material layers (made of a Si compound), as is a characteristic with materials themselves.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that the materials for the current collector and anode active material embodied by Fujimoto et al. and Fukui et al. (copper and a Si compound, respectively, as set forth above) are similar to that embodied by the instant application (which

embodies an active material with silicon or tin and a current collector of copper, titanium, aluminum, and nickel). See p 9, first paragraph of the Specification. Accordingly, the exemplified prior art materials would inherently have the characteristic of a current collector that can easily alloyed with that of the active material.

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

There is no requirement that a person of ordinary skill in the art would have recognized the inherent disclosure at the time of invention, but only that the subject matter is in fact inherent in the prior art reference. Schering Corp. v. Geneva Pharm. Inc., 339 F.3d 1373, 1377, 67.

Accordingly, the materials (current collector as well as inner and outer active materials) as exemplified by Fujimoto et al. are easily alloyable, and thus when the heat treatment of Fukui et al. is applied (as set forth in part (a) above), the result is a current collector that is easily alloyed with the outer and inner active material layers.

With respect to (c), Ikeda et al. teach of a rechargeable lithium battery where current collectors having layers of active material provided on opposite faces thereof may be prepared from two current collectors each having a layer of active material on its one face by joining the back faces to each other (thus resulting in a two layered current collector with active material on either side) (col. 6, lines 40-45). One having ordinary skill in the art at the time the claimed invention was made would have found it obvious to create a current collector with active material on both sides, as disclosed by Ikeda et al., since such a known method of forming a current collector with active material on opposing sides would yield the predicable result of having a similar structure (active material on both sides of a current collector, whether the current collector is one or two layers), which would have operated in the same manner. Accordingly, it is seen that whether a current collector is a single layer (as embodied in the primary reference, Fujimoto et al.) or plural layers (as taught by Ikeda et al.) lacks criticality, as both would yield the same result of having electrode active material coated on both sides of a current collector for use in a battery. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the single layered current collector with active material on both sides with a current collector with plural layers wherein active material is on both sides, as Ikeda et al. teach that such a method is known to make a current collector with active material on both sides, and the application of such a method would yield the predicable result of having a similar structure (active material on

both sides of a current collector, whether the current collector is one or two layers), which would have operated in the same manner within a battery.

As to claim 2, Fujimoto et al.'s most specific formula of the active material used is $SnSi_tP_uAL_vO_s$ represented by formula (V) (p4, line 50). Furthermore, the use of tin monoxide and silicon dioxide is exemplified in the synthesis examples 1-5 (p7-8),

As to claim 3, the outer anode active material layer and the inner anode active material layer are inherently alloyed with the current collector, because the tin used in the exemplified in the anode active material is able to be alloyed with the exemplified anode current collector (copper, as is used in example 1 on p12, lines 22-26).

As to claim 4, in example 1, a negative electrode material is prepared via dispersion and applied to the current collector (p12, lines 22-26). This application is a liquid-phase deposition.

Response to Arguments

6. Applicant's arguments filed November 10, 2008 have been fully considered but they are not persuasive.

Applicant argues that Fujimoto et al. does not suggest alloying the current collector with the anode active material.

Examiner submits that this limitation is obviated by Fujui et al., and thus such an argument as applied to Fujimoto is irrelevant. Thus the rejection of the limitation using the combination is upheld.

Applicant argues that Fujimoto et al. does not teach of current collector that has a plurality of layers

Examiner submits that this newly presented limitation has been obviated by Ikeda et al. Therefore, the rejection of record is upheld.

Applicant argues that Fukui et al. does not teach of an anode current collector with a plurality of layers.

Examiner submits that this newly presented limitation has been obviated by Ikeda et al. Therefore, the rejection of record is upheld.

Applicant argues that the claims require that the current collector layer be material that easily alloys with the material to the specific alloy it is in contact with, which is not taught.

Examiner respectfully disagrees with Applicant. As set forth in the rejection the combination of Fukui et al. with Fujimoto et al. would result in such an alloying (as set forth in the response to (b) in the rejection to claim 1). Such reasoning as to why the combination yields the structure is reiterated for clarity's sake. First it is set forth that the alloyabitliy of materials is dependent on those materials. Since both Fujimoto et al. and Fukui et al. teach of materials similar to that set forth in the instant application, the same characteristics (of being able to alloy) would be present. Accordingly, the sintering/heat treatment of Fukui et al. (similar to that of the instant application, as set forth in response to (a) in the rejection of claim 1) as applied to Fujimoto et al. would result in the claimed alloyed structure. Please see the rejection of claim 1 for full details. Accordingly, it is submitted that the combination meets the structure of the claimed invention.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

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